THE CRITICAL PERIOD OF WHEAT AT COLLEGE PARK, MD.[1]

By W. J. SANDO.

[Author's abstract.]

In the fall of 1920 a careful study was initiated for the purpose of ascertaining the relation of climate to the yield of wheat grown on the Maryland Agricultural Experiment Station farm at College Park. Four varieties of wheat were used in making the study. The yield records cover a period of 12 years.

Correlation coefficients for temperature and precipitation for each month of the growing period and for each variety were determined. A significant negative correlation was found between precipitation and yield for March and May. No significant correlation could be found between temperature and yield.

Other factors were also investigated, but further study will be necessary before their actual relation to yield are determined.

DISCUSSION.

In the discussion of Mr. Sando's paper it was stated by C. F. Brooks that a tabulation of wheat yields and corresponding rainfall in different parts of the United States showed that the best yields were obtained with about 30 inches of annual rainfall, and that the yields where the rainfall was over 50 inches were about as poor as in the regions where the rainfall was less than 15 or 10 inches a year. College Park, Md., being in a region with an average rainfall of about 50 inches a year, would thus have better yields when the rainfall was less than the average, while a place in the semiarid West would have better yields when the rainfall was more than the average. Even though, theoretically, plentiful rainfall between the time of heading and time of harvest should be beneficial, the damage done by smuts and rusts in the warm moist weather of eastern Maryland seems to be responsible for the greatly reduced yields when there is much rainfall in this period.

[1] Presented before American Meteorological Society, Apr. 20, 1921.

INDICATOR PRECIPITATION-STATIONS FOR PREDICTING STREAM DISCHARGE.

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SYNOPSIS.

Three precipitation stations, widely separated and manned by cooperative weather observers, are utilized to predict the flood-time discharge of Bear River, a Utah-Wyoming-Idaho stream whose watershed covers 2,900 square miles. From precipitation data available at the end of January a prediction can be made, according to the author, as to whether the flood period of March–July will be high or low as compared with the average; at the end of February a verification or modification of the January prediction can be made; at the end of March an approximation of the quantity of the run-off in day second-feet may be ventured; and at the end of April a quantity estimate can be given which will no doubt closely approach the actual flood-period run-off. From a developed relation of flood and nonflood period run-off, it is also claimed to be possible to predict in advance the run-off during the nonflood period. Only quantity forecasts are attempted, no effort being made to state the form of run-off curve.—*J. C. A.*

From the importance which Bear Lake, Utah-Idaho storage has in the successful operating of the generating system of the Utah Power and Light Company, comes the desire to successfully predict as far in advance as possible the probable run-off susceptible to storage.[1] On account of the size of the drainage area, about 2,900 square miles, and the inaccessibility of the greater part of it, which includes mountain regions from 8,000 to 10,000 feet in elevation, the ordinary methods of determining probable run-off by intensive snow surveys can not be attempted.

Several years ago studies were begun by the author to determine whether the data obtained by the existing cooperative stations of the United States Weather Bureau could be used in forecasting probable run-off. The belief was entertained that while these stations were situated in the valleys, they still might serve as "indicators" of the precipitation which occurs over the whole area. This has been found to be approximately the case; and is due apparently to the fact that the more important winter storms extend over large areas and precipitation occurs over similar elevations and slopes with considerable uniformity.

The precipitation records from three cooperative stations have been used, namely Border and Evanston, Wyo., and Laketown, Utah. Border is located on the Wyoming-Idaho border about 12 miles northeast of the north end of Bear Lake; Evanston is near the Wyoming-Utah border about 60 miles south-southeast of the south end of Bear Lake; and Laketown is about 2 miles south of the south end of the Lake. These are the only weather stations in this general region having continuous records for many years, the length of the shortest record being about 18 years. Fortunately these stations are located rather far apart, are in desirable locations, and have dependable observers who have served almost continuously at each of the stations.

As the normal precipitation at the three stations is not the same, in order to give equal weight to the three records, the amount in inches for the various periods for each station has been converted into percentages of the average for the 18-year period, and the mean of the three percentages has been used as required in the comparisons.

The run-off records available are from the Dingle gaging station from 1903 to 1915 and from the Harer gaging station since 1913. The annual values appear in Table 1. Both stations are situated above the point of diversion into Bear Lake from Bear River. The quantity of water diverted from the main stream above Harer is partly a matter of river stage, and more water is diverted when the bulk of the run-off occurs in June rather than when it occurs earlier in the season. This statement, it is believed, explains the somewhat erratic plotting of a part of the Dingle points on the comparison diagrams.

On figure 2 four comparisons of precipitation and run-off are made. These consist of four calendar arrangements of the precipitation, namely, November-January, November-February, November-March, and November-April, each of which is compared with the March-July or flood run-off measured at Dingle and Harer.

[1] Alter, J. Cecil: The weather and daily stream flow for hydroelectric plants. Mo. WEATHER REV., May, 1919, 47: 307-309.